

# IEA SHC Task 48 7<sup>th</sup> expert meeting



## Quality assurance and support measures for Solar Cooling



### Feedback on tests of the B4 PISTACHE Tool

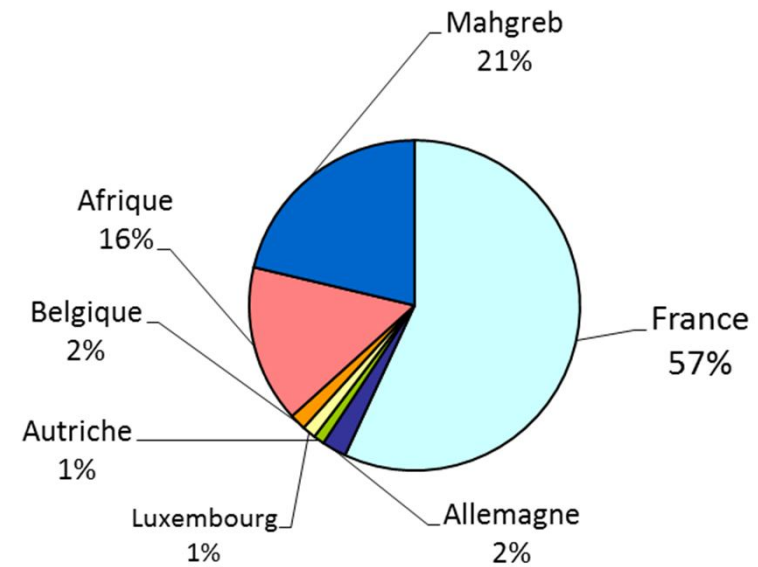
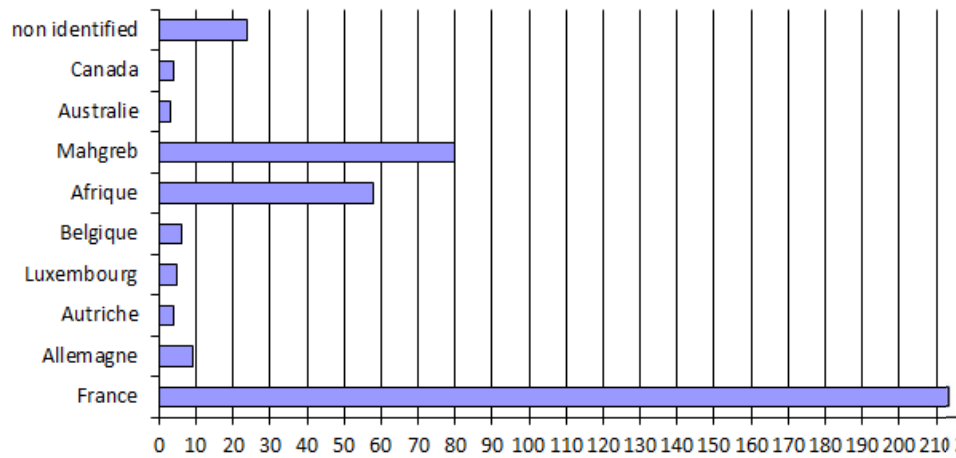
Daniel MUGNIER – Garching, 29/09/2014

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# Downloads

**Nearly 400 on 23/09/2014**

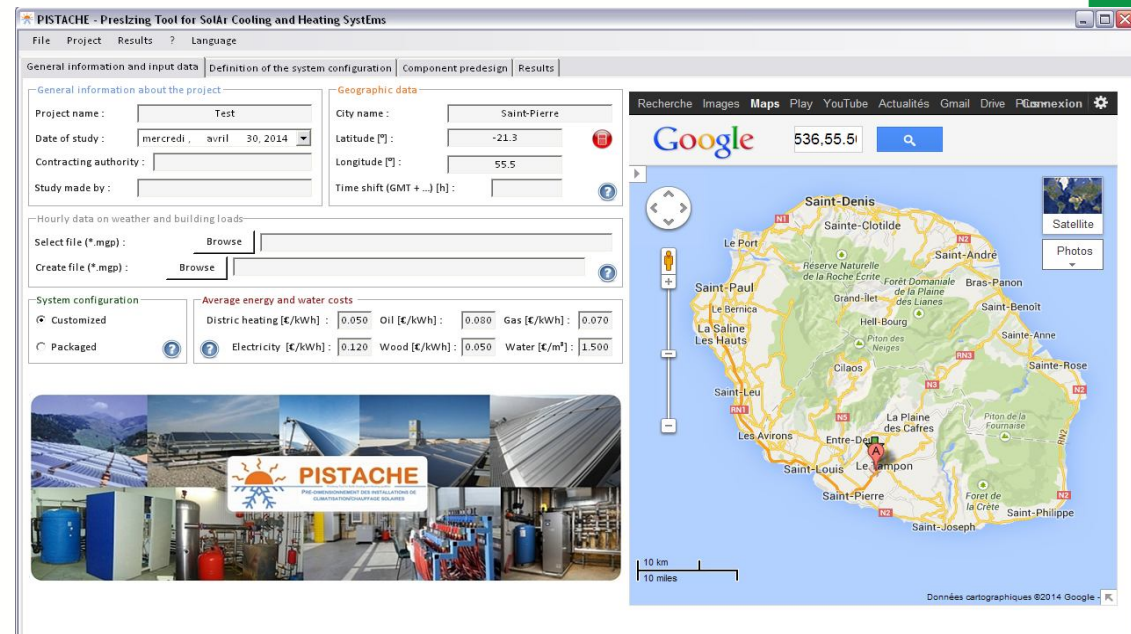


# Pre-size & technical & economic feasibility study

- PISTACHE : Presizing tool for solar cooling & heating systems
  - Quick and easy to use from feasibility study to the operation phase to check the performance of a realized installation

## General information and input file upload:

- site localization
- hourly data of meteorological information and building demands
- energy and water costs



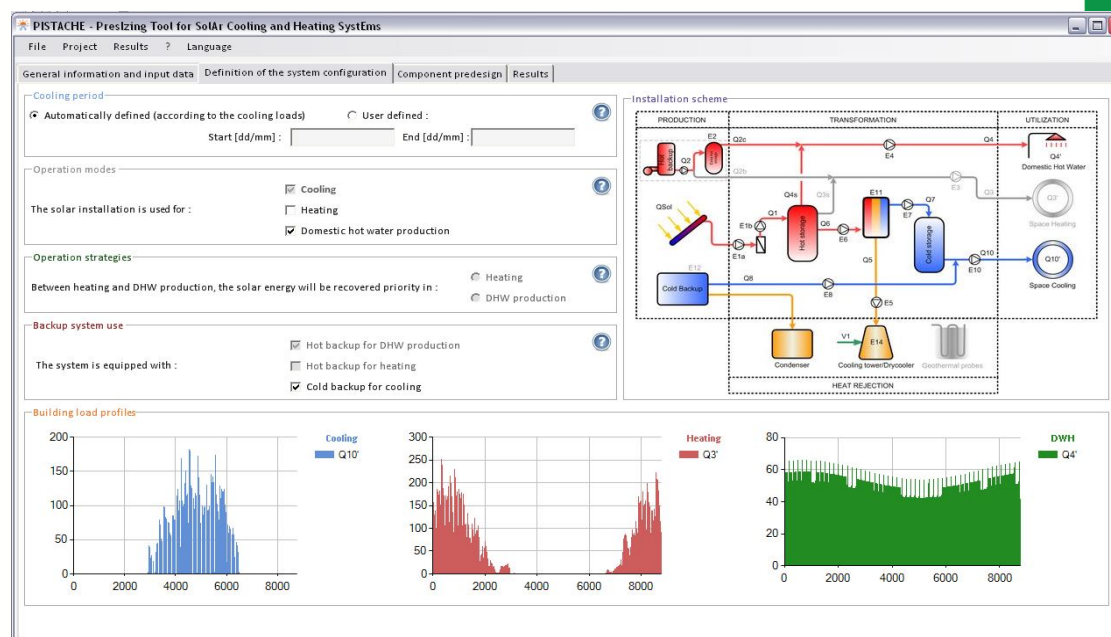
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# Pre-size & technical & economic feasibility study

- PISTACHE : Presizing tool for solar cooling & heating systems
  - Quick and easy to use from feasibility study operation phase to plan the performance of a realized installation

## Simulation information and scheme definition:

- automatically made through 12 standardized hydraulic scheme
- based on installation configuration (use of solar installation, hot and/or cold backups...)



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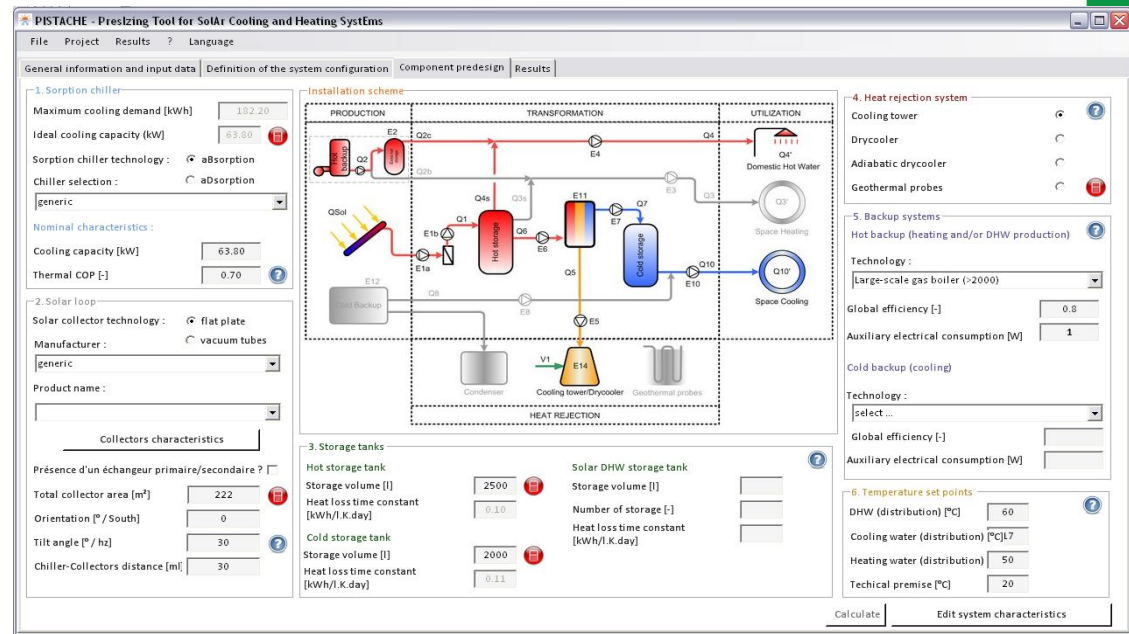


# Pre-size & technical & economic feasibility study

- PISTACHE : Presizing tool for solar cooling & heating systems
  - Quick and easy to use from feasibility study operation phase to plan the performance of a realized installation

## Component characteristic and sizing:

- define each components
- with/without help (pre-sizing functions, default values, database of components, ...)



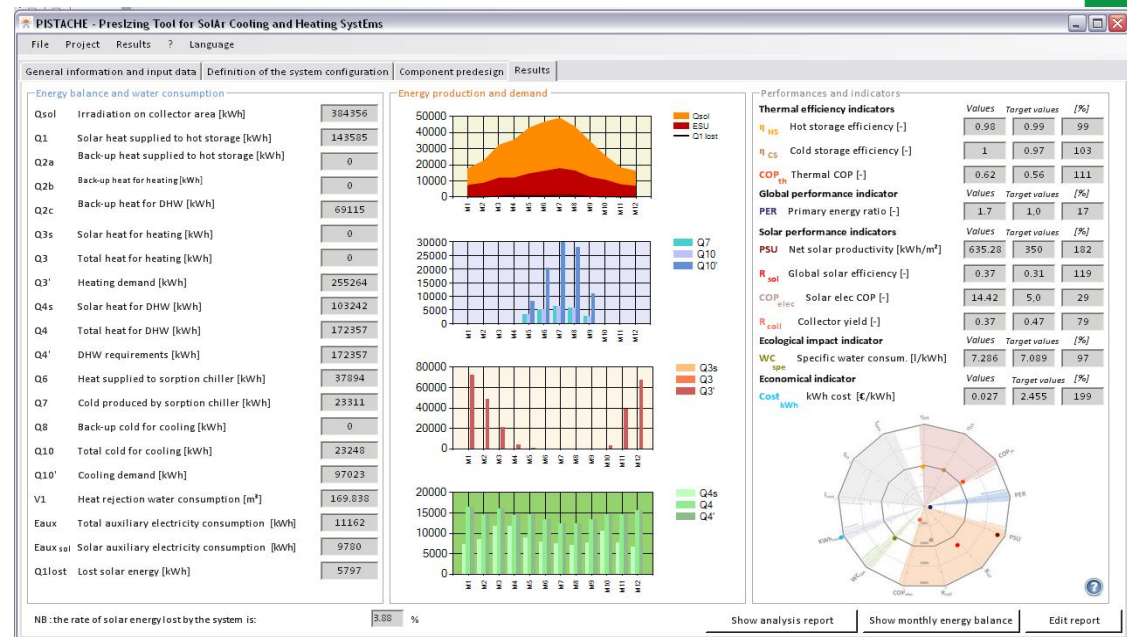
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# Pre-size & technical & economic feasibility study

- PISTACHE : Presizing tool for solar cooling & heating systems
  - Quick and easy to use from feasibility study operation phase to plan the performance of a realized installation

## Results:

- monthly and annual energy balances
- main performance indicators and their target values,
- automatic short interpretation of the result, automatic warning for oversizing ...



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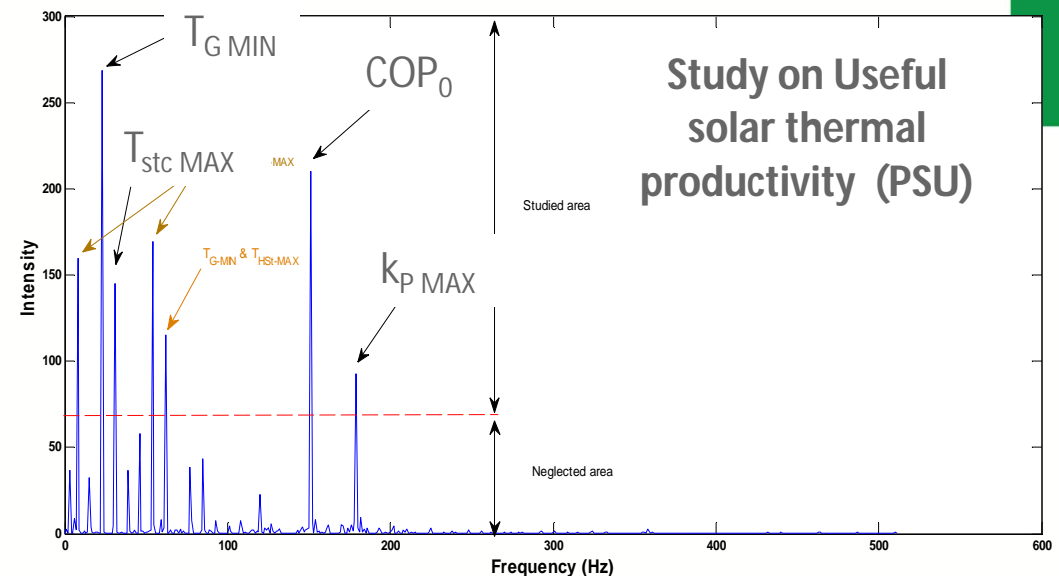
# Pre-size & technical & economic feasibility study

– Validation of PISTACHE tool

1. Sensibility analysis on 37 parameters (temperatures, thermal losses coefficients, maximum cooling capacity and nominal COP of chillers, ...) using FAST method (Fourier Amplitude Sensitivity Test)

## Results:

- Identification of most influential parameters
- Reliability of the tool by carrying out a large number of runs
- Overall coherence validation of calculation method



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# Pre-size & technical & economic feasibility study

– Validation of PISTACHE tool

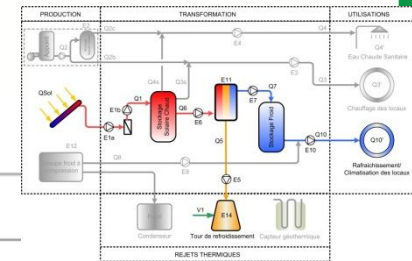
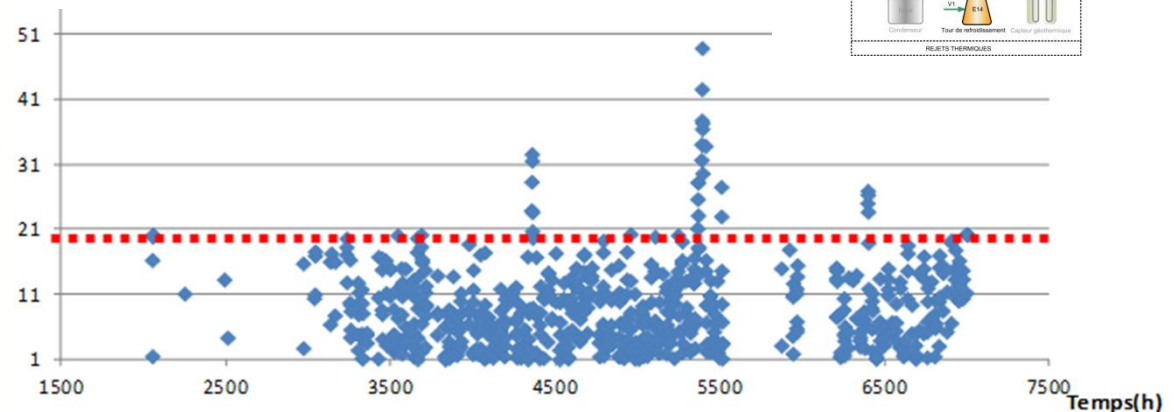
1. Sensibility analysis on 37 parameters
2. Comparison with numerical results using detailed and validated simulation model

## Results:

- Errors lower than 20% (for 96% of points)
- Results are coherent with the validated simulation tool results



Study on COP<sub>th</sub> for a solar cooling plant



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# Pre-size & technical & economic feasibility study

- Validation of PISTACHE tool
  1. Sensibility analysis on 37 parameters
  2. Comparison with numerical results
  3. Comparison with monitoring data from real installations
    1. Parameters identification on 1<sup>st</sup> year of monitoring data
    2. Validation on 2<sup>nd</sup> year of monitoring data

Error [%]	Solar energy	Cooling	Heating
Solar cooling	5,8	10,8	
Solar cooling & heating	4,1	<b>5,8</b>	0,5

## Results:


- Relative errors lower than 10% between experimental and numerical results
- Acceptable global error for a pre-sizing tool



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# Master th. Student in Australia

**THE UNIVERSITY OF NEW SOUTH WALES**  
SCHOOL OF PHOTOVOLTAIC AND RENEWABLE ENERGY ENGINEERING



**Modeling of Solar Driven Absorption Cooling Systems for  
Hotels in Australia**

Yuan Ip  
Bachelor of Engineering in Renewable Energy Engineering  
Course Code: SOLA4911  
Submission Date: 3rd June 2014  
Supervisor: Dr Robert Taylor  
Assessor: A. Prof Alistair Sproul

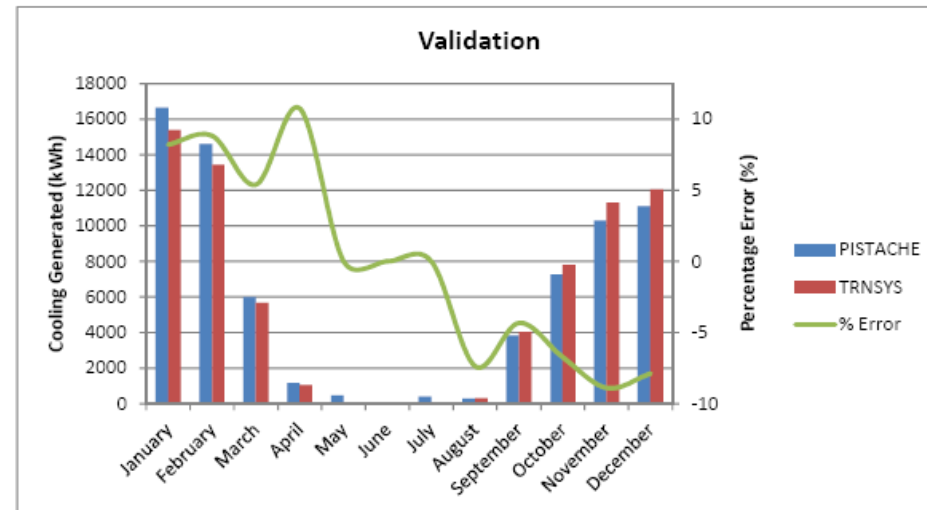


Figure 44 - Validation with PISTACHE

TRNSYS / PISTACHE Comparison : % error between -10 and +10%

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**Thanks for your attention !**

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